A LUMINOUS METEOR CLOUD OBSERVED AT URBANA, ILL.

By Prof. C. J. KULLMER. Dated Syracuse University, N. Y., December 14, 1908.

The growing recognition of the importance of meteor observations for the study of upper-air currents leads me to believe that some use may possibly be made of an observation made at Urbana, Ill., November 14, 1904. At $14^h\ 49^m\ 15^s \pm 4^s$ central time appeared in Leo Majoris a bright meteor, the course of which is given at No. 1 in fig. 1; the position was

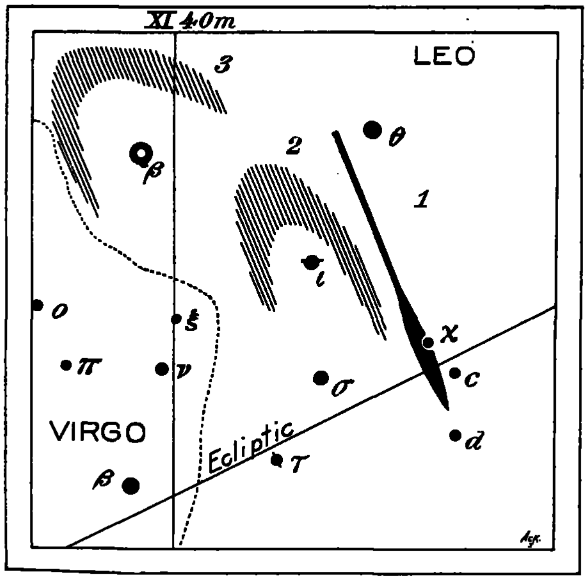

FIG. 1.—Meteor and meteor cloud in Leo Majoris, November 14, 1904.

accurately fixt by the small star triangle. In my note book I wrote: "At first two centers," which, interpreted from memory, means that at the beginning of the shaded part of the line a nucleus was formed; the meteor continuing, however, and forming a second nucleus. No. 2 in fig. 1 shows the position and shape of the luminous cloud while still visible to the naked eye; it remained thus visible for eight minutes, but my notes do not give the time of position No. 2. No. 3, however, shows the position and shape of the cloud at $15^h\ 4^m$ as seen thru an opera glass. This meteor was also observed at the university observatory, one mile to the west, by Dr. Joel Stebbins, who published a note concerning it in Popular Astronomy, vol. 13, p. 56. For the interpretation it may be convenient to add, that an area of high barometric pressure of 30.4 inches was central at longitude 86° west, latitude 36° north, about 300 miles southeast of Urbana, and a marked low pressure of 28.6 inches central at longitude 63° west, latitude 45° north. Other meteors observed at this time were: seven from $12^h\ 45^m$ to $13^h\ 45^m$; thirteen from $14^h\ 10^m$ to $15^h\ 15^m$; twenty-seven from $15^h\ 39^m$ to $16^h\ 39^m$.

THE TRAINING SCHOOL AT TOKYO, JAPAN, FOR METEOROLOGICAL OBSERVERS.

A letter dated November 23, 1908, from Prof. T. Okada, in charge of weather forecasting at the Central Meteorological Observatory, Tokyo, Japan, informs the Editor of the recent establishment and inauguration at that observatory of a training school for meteorological observers. This school is established for the members of the provincial meteorological stations, in order to provide such knowledge as is necessary for discharging their regular duties, and to secure more uniformity as well as a higher standard in their attainments. Apparently the course of instruction must cover several years of work. Observers who are graduates of a high school and have past entrance examinations at this observatory are admitted.

This year the number of students is 17. The courses of lectures are:

1. Mathematics. (Analytical geometry, differential calculus, and exercises.)
2. Physics. (Experimental physics.)
3. Apparatus and methods of observing.
4. Spherical astronomy (including spherical trigonometry.)
5. Seismology.
6. Meteorology (elementary and advanced.)
7. Physical experiments.
8. Meteorological observations.
9. Weather charts.

This extensive course of training at Tokyo covers even more ground than the analogous course established by Gen. William B. Hazen in 1882 for the benefit of the enlisted men under instruction at Fort Myer, Va., full details of which will be found in Annual Report Chief Signal Officer, 1882, Pt. I, p. 97–172. That course was maintained for several years under the special supervision of Prof. Frank Waldo.—*C. A.*

THE CLASS UNDER INSTRUCTION AT WASHINGTON.

A class for the instruction in station duties of newly appointed assistant observers has been established at the Central Office of the Weather Bureau at Washington, D. C. It is the intention, as far as practicable, to give each newly appointed assistant observer at least three months' training in the work done on station, including practise in telegraphy, typewriting, taking and enciphering of observations, preparation of forms, and the care of instruments. There are at present nine assistant observers under instructions.—*H. E. W.*

FORMATION OF DEW AT TREE-TOPS.

A correspondent inquires whether dew collects on the leaves at the tops of high trees so that they are moist at night in the summer time.

The general law with regard to the formation of dew simply requires that the surface on which dew forms shall be so cold that the air in contact with it and gently flowing over it, shall be cooled below its temperature of saturation, or to the temperature that we call the dew-point. This cooling can only be accomplished by radiation of heat from the surface outward thru the air, or by conduction from it inward thru the solid. The latter process is rare in nature, but is well illustrated in using the Regnault dew-point apparatus. The former process is the one ordinarily met with in nature. We think of the air near the ground as cooling slowly by its own radiation downward, since its radiation upward is counteracted, to a large extent, by absorbing the downward radiation from the air above it. Radiant heat has definite wave-lengths characteristic of its origin and these waves, radiating from a given body, are completely absorbed by other masses of the same body, but are not likely to be absorbed by masses of other bodies. When waves of radiation from the sun or the air strike a solid substance and penetrate its outer layer of molecules the latter radiate back heat of other and usually longer wave-lengths, and these pass thru the air with very slight absorption, except in so far as they are stopt by dust and fog or cloud. Thus it happens that the solid surfaces of the ground, vegetation, snow, or ice cool more rapidly than the air above them; the thin layer of air in immediate contact with the surfaces is especially cooled and leaves a little of its moisture on them as it settles down to some lower level by what has happily been called the drainage of cold air.

The rate of cooling by radiation increases in proportion as the surface is thermally insulated or cut off from receiving heat by conduction from the ground below; and also in proportion as it is more freely exposed to the clear blue sky above. Not only do clouds reflect back the heat radiated outward, but the walls of buildings, the sides of valleys, and adjacent trees diminish the free exposure and the chance to radiate.

It would be difficult to say, a priori, just where to look for dew on the tops of high trees, but it occurs so frequently on the tops of high buildings that we are persuaded that it must sometimes occur on the tree tops. We hope that some of our correspondents may discover such locations and communicate directly with Mr. D. M. Rodgers, Special Field Agent, Bureau of Entomology, Department of Agriculture.—*C. A.*

HURRICANES AFFECTED BY MOUNTAIN RANGES.

In the Meteorological Bulletin of the Observatory Saint Martial, Port au Prince, Haiti, for the month of October, 1908, Prof. J. Scherer, director of the observatory, writing about the hurricanes of the 28th of September, says:

> This cyclone was announced on the 25th by the Weather Bureau at Washington as then existing south of the island of St. Kitts and moving toward the WNW. It entered the island of Haiti at the Bay of Neybe [Neyda?] on the evening of the 27th. Traversing the northern slopes of the mountain ranges Santa de Bahoruco and La Selle, it past to the south of Fonds Parisien and of Ganthier, over Fonds Verretes, Pays Pourri Troucoucou and the upper courses of Grande Riviére du Cul de Sac, only to descend into the basin of the Momance and enter the ocean between Léogane and Port au Prince. Thence it continued its path toward the eastern point of Cuba, which it past over at 7 p. m.
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> The orography of the island has had a deflecting influence on the path of this hurricane. Without getting free from the high mountains of 2,000 meters it remained at an altitude of 1,000 meters thruout its principal path, leaving the crests of the high mountains on its left. After entering the island its first destruction was at Anse à Pitre, Grand Gosier, and Sale Trou, where there were 260 houses destroyed and 98 deaths. * * * On the right-hand side of the hurricane lies the Plaine du Cul de Sac, which suffered most. The principal rains fell after the passage of the hurricane; every river in the plain rose above its banks.
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> Here at Port au Prince the wind remained from the northeast up to 4 a. m.; at 5:10 a. m. it turned to the north where it remained only until 5:30 a. m., after which there was a calm of fifteen minutes. At 5:45 a. m. the wind suddenly jumped to the southeast and south-southeast.
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> The maximum velocity was 23 meters per second at 5:50 a. m.
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> The barometric readings were at 9 p. m., 756.9 mm.; at midnight, 756.2 mm.; 3 a. m., 753.1 mm.; 5 a. m., 746.0 mm.; 5:25 a. m., the minimum, 743.2 mm.; 6 a. m., 744.5 mm.; 7 a. m., 750.4 mm. During the calm the pressure rose 1.5 mm., but fell again until 5:55 a. m.
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> The minimum temperature occurred at the moment of the calm.
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> The relative humidity fell 10 per cent.
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> The direction of the motion of the clouds was, successively, NE., E., and S.

It is very desirable that some one should explain, in detail, the mechanism by which a given range of mountains or the coast of a continent deflects the path of a hurricane center. The east-west ranges in the West Indian Islands and the northeast-southwest Appalachian Range appear to have appreciable influences on some storms, but not on others.—*C. A.*

IS THE EARTH DRYING UP?

Under this startling heading the Literary Digest of July 11, 1908, discusses a memoir by G. Guilbert, published in the Bulletin of the Calvados Meteorological Commission.

We assume that our colleague does not intend to start a new sensational paragraph on its travels around the globe, but yet some of Mr. Guilbert's paragraphs have been so translated that, taken by themselves, the average reader would easily be led to infer that meteorologists are face to face with a climatological revolution. Thus a reviewer in Cosmos, under date of May 30, is said to have written:

> The progressive diminution of rainfall is a fact that is becoming better and better established and even universally known. As meteorological observations are perfected and prolonged the phenomenon is more certain and forces itself upon our notice.

The writer then quotes the records of total annual rainfall and melted snow at Nancy, in the Department of Meurthe-et-Moselle, showing a diminution from 896 to 628 millimeters, or 28 per cent in thirty years, between 1878 and 1907, or at the rate of 1 per cent per annum, but he recognizes the fact that, of course, the rainfall can not go on constantly decreasing at this speed.

> In nature everything vibrates, everything oscillates, the more the rainfall decreases the nearer will come the time when it will begin to increase.

Facts and logic alike concur in showing that a diminution of rainfall thus observed in one portion only of France has no counterpart elsewhere and is not universally known, and is not likely to be true everywhere.

But granting these alternations of wet and dry periods our colleague goes still further and adopts the theory that the diminution of rainfall—

> * * * is a persistent and progressive phenomenon which nothing has checked since the origin of rain on the globe, at least since the glacial period, and which nothing will modify in the future—the rain will continue to diminish century by century as it has always done over the whole globe since prehistoric times.

From this wild statement an argument for the necessity of reforestation is then drawn: "If we do not wish to grow rapidly drier and drier * * * reforestation is necessary." One can but regret that such palpable errors, long since dropt by conservative students, should continue to be disseminated among the people.

Forests do not increase rainfall, but merely conserve it in the cool, sheltered, porous forest soil. Forests do not give back to the air and clouds more moisture than do cultivated fields or swamps or lakes or oceans; they are conservers, not lavish spenders; they do not themselves rob the air of moisture. The influence of reforestation, as such (to increase the rainfall or that of deforestation to diminish the rainfall), has been abundantly demonstrated to be quite inappreciable and probably nothing at all. To be sure forests grow on rocky slopes of mountains wherever there is sufficient soil and rainfall and heat, or a cloudy and moist atmosphere, but they also grow at sea-level on such plains as that of the Amazon, and wherever there is enough moisture, light, heat, etc.

The only way to prove that forests increase rainfall is to measure the precipitation before and after and during the process of reforestation *and be certain that your measurements are correct.* It is this last point that is most difficult of all. The slightest change in the exposure of a rain-gage to the wind *affects its catch, but not the rainfall,* and as for *correct* measurements of snowfall we are completely at sea.[1]

Local reforestation is advisable and necessary for many good reasons, but not in hopes of *increasing* the local rainfall. As for the so-called secular diminution of rainfall, we venture to assert that neither meteorology, nor geology, nor any other branch of geognosy gives clear, unimpeachable evidence of the progressive drying up of our globe as a whole. The fact that great glaciers, lakes, and rivers once covered regions now free from them merely shows that in those regions there was once a different relation than now exists between rainfall, snowfall, evaporation, and run-off, so that snow accumulated then more than now. At the present time there is more rain and less snow, or possibly more snow and more melting (possibly due to changes in altitude), so that the snow can not accumulate. The ratio of the snowfall in the cold half of the year to the rainfall in the warm half, must in general be large before snow will accumulate as in the glacial epochs of previous geological ages. Glacial phenomena tell us nothing whatever as to the absolute quantity of rain or snow.

As to the rainfall over the whole earth, all the statistics that have been accumulated in the past century have not sufficed to give us satisfactory information.

The works of Supan, 1898; Bartholomew, 1900; Herbertson, 1901; and Murray, 1903, serve only to give us very general ideas as to the *present* amount over the whole globe; as to the

[1] See "The measurement of precipitation," reprinted in the Monthly Weather Review for 1899, Vol. XXVII, p. 464–468.